

Developing A Potential Discovery Path within Cryptozoology

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“A Salteur I found tented with the Courtes Oreilles came to me very ceremoniously, and having lighted and smoked his pipe, informed me that he had been hunting up a small river a few days ago, and that one evening, while in his canoe, he was surprised by the appearance of a very large animal in the water. At first he took it for a moose, and was about to fire at it; but on its nearer approach perceived it to be one of the Kitche Amicks or large beavers, which he dared not shoot, and allowed to pass near his canoe without molesting. I had already heard many stories among the Saulteurs concerning this immense beaver, but put no faith in them; fear, I presume, magnifies an ordinary beaver into such a monster, or a moose or bear in the dark may be mistaken for one of them, as they are seen only at night, and I am told are very scarce.” (Alexander Henry, in Coues 1897)

For years, I have noted that cryptozoology is best viewed as a methodology rather than a distinct field of study. This removes a number of trivial debates (e.g. how large an animal must be to be relevant to cryptozoology) and focuses on a well-supported zoological discovery technique (Arment 2004). Simply stated, the cryptozoological methodology is:

- a) Identify the target (referred to as a cryptid, or mystery animal)
- b) Gather information about the mystery animal and its alleged environment
- c) Use that information to gather confirmative physical evidence, making that evidence available for scientific testing, and if positive, for taxonomic designation and publication

This is the general cryptozoological methodology, but there are numerous legitimate alternate pathways within cryptozoology proper. For example, mystery animals can be identified from ethnozoological field research, from literature searches, from speaking to travelers, or personal experience. To evaluate the legitimacy of a mystery animal, different known species that might be misidentified will need to be considered. Hunting techniques will differ, depending on the type of alleged animal or the environment itself.

Here, I am proposing a methodological pathway that could potentially determine the existence of a very specific category of cryptid.

In most cases, “confirmative physical evidence” requires more than just DNA. A zoologist wouldn’t usually attempt to describe an unknown species with an unknown genetic sample; most zoologists would wait until they have a specimen, to evaluate morphological differences. However, recent advances in genetic testing have opened up a potential new avenue for cryptozoological discovery. Environmental DNA can be gathered and the presence of species identified even when they are not otherwise confirmed. The technology available allows for quick results, and is commonly used to detect invasive organisms and rare species. Now, for this to work as a cryptozoological technique, the species sought has to already be identified, so a completely unknown species can’t be targeted. But if an animal is believed extinct, it can be pursued through environmental DNA if its genetic profile is known.

One limiting factor is that this testing works best in freshwater environments. DNA spreads within these aquatic environments (though degraded into smaller fragments), but would be difficult to specifically locate in a terrestrial environment. (Marine environments are more complex, and a greater challenge, but technological advancements in the future may open this up further.) To illustrate both the potential and credibility of this technique, one simply has to examine the use of environmental DNA detection in searching for elusive Burmese pythons in South Florida, particularly in confirming populations where that invasive snake was not yet known (Piaggio et al 2014; Hunter et al 2015).

If we have a target organism that is believed extinct, and lives in a freshwater environment, it can be targeted to determine persistence in that environment. (It is possible to detect terrestrial species from contact with freshwater environments, but that is an area still being developed (Ushio et al 2016).) Now, from a practical standpoint, this has actually

been recently proven to work. The Alabama sturgeon, a fish feared extinct, as it hadn't been seen in several years, was determined to persist in Alabama waters through environmental DNA targeting (Anonymous 2016; Raines 2016; Pflieger et al 2016).

Now, I think we can take this a step further. Another fairly recent innovation is the extraction and analysis of "ancient DNA" from extinct organisms (*Camelops* (Heintzman et al 2015), *Mylodon* (Clack, MacPhee, and Poinar 2012), *Mammuthus* (Palkopoulou et al 2015), *Arctodus* (Mitchell et al 2016), etc.). Some, though certainly not all, unmineralized ancient remains are preserved well enough for DNA to persist to the present day. If a mystery animal is suspected to be closely related to a known extinct species, especially if that species is partially or fully aquatic, and if enough ancient DNA is available to create a genetic profile (and so available to create a primer and probe sequence sufficiently specific and sensitive enough to target and amplify the desired DNA (Pilliod et al 2012; Wilcox et al 2013)), it may be possible to incorporate ancient DNA into a cryptozoological methodology.

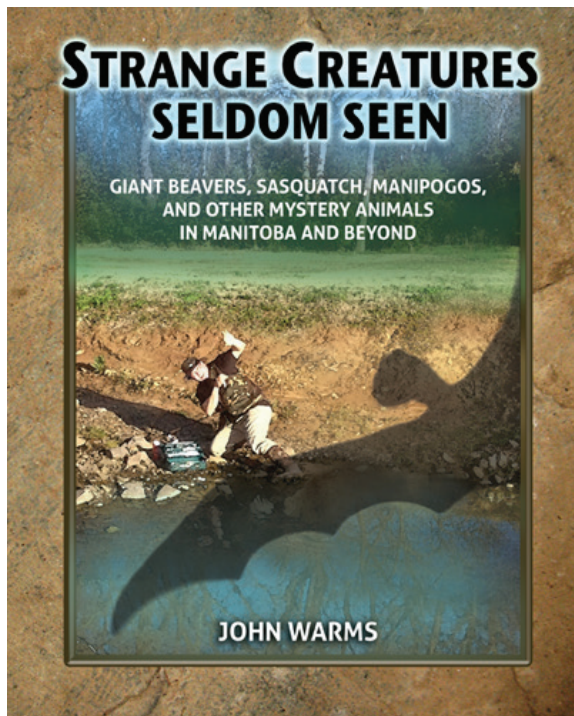
A perfect target for this sort of cryptozoological investigation would be the giant beaver, *Castoroides ohioensis*. John Warms' research in Manitoba (Warms 2015), suggests that this species may well persist to the present day. Ancient DNA extraction from *Castoroides* appears to have had limited success so far (Cleland et al 2016), but that may be due to poor DNA persistence in museum collection material. Freshly excavated fossil bones offer higher quality DNA samples (Pruvost et al 2007). I have no doubt that a concerted effort to create a complete genome sequence of *Castoroides ohioensis* would be successful, and that it would then be possible to create genetic primers to target persistent populations of that species and determine if it does, in fact, still exist. So long as the primers are sufficiently specific to rule out the smaller North American beaver, I think this is one of the few targeted methodologies that would not require a physical specimen to prove that a mystery animal exists.

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Strange Creatures Seldom Seen, by John Warms

John searches for mystery animals in Manitoba.